

534 Rec'd PCT/PTC 14 JUL 2000

Multimedia System, Portable Operating Device
and Communication Module for Use in Said System

The present invention relates to a multimedia system and a portable operating device and communication module for use in the multimedia system.

In the "Funkschau" journal, No. 16, 1997, pages 61 to 63, a set top box for digital television (DVB) is described, for use in a multimedia system including a television set, a satellite dish, a telephone connection, etc.. The known set top box has an open interface with a plurality of slots, which is configured in accordance with the Common Interface (CI) standard for digital television (DVB CI standard), which for its part is a substandard of the PC card standard or PCMCIA standard (PCMCIA = Personal Computer Memory Card International Association). CAM modules (CAM = Conditional Access Module) in accordance with the PC card standard may be inserted into the slots as access control modules for digital television with or without Pay-TV or Pay-on-demand. Aside from one or more CAM modules for digital television, for instance a communication module, a module for banking applications, one or more storage modules, etc. may be plugged into further slots of the open interface, as required, which are configured in accordance with the DVB CI standard.

The present invention provides a multimedia system in which the configuration of the base station is independent of the requirements for the operation of the communication module.

The multimedia system in accordance with the invention comprises a receiving device for multimedia transmissions, a display device such as, e.g., a television set, a monitor, a

liquid crystal display or the like, for graphical representation of multimedia contents, a base station such as, e.g., a set top box, including an open interface for interchangeable access control modules, and a communication module which may be connected to this open interface, as well as a portable operating device assigned to this communication module. The base station does not require any separate operating elements for operating the communication module.

Accordingly, the present invention has the decisive advantage that the base station or set top box only provides the open interface for the communication module, whereas the functions thereof are controlled by a portable operating device, for example, by a remote control. Since the control of the functions of the communication module in the multimedia system in accordance with the invention is carried out by means of a separate portable operating device which is assigned to the communication module, and both the portable operating device and the communication module controllable by it are stand-alone components, the configuration of the set top box is completely independent of whether a communication module is used at all, which communication module is used, and how the communication module is controlled or operated. Yet, the display functions of the display device of the multimedia system can be made use of when operating the communication module.

The communication module may include a modem which may be a telephone modem or a data radio modem, for example. The data radio modem preferably operates in accordance with the DECT process or the GSM process.

A communication module having a data radio modem allows a considerably higher data transfer rate than the simple telephone modem function of the standard modems which are usually provided in set top boxes. The data radio thus also permits a

further, fully adequate "forward channel" independent of the television channels, that is, a data transfer with a high data transfer rate from the superordinate network to the particular user. The "backward channel" may continue to be implemented via the standard modem, but may alternatively be provided via the communication module as well.

The communication module may have an access control function, which may be realized by an exchangeable chip card or multimedia card or the like, for example. The communication module is preferably configured as a plug-in type PC card in accordance with the PCMCIA standard.

The communication module in the form of a PC card may for its part be configured in the nature of a CAM module (CAM = Conditional Access Module) for the accommodation and function of a chip card. Owing to the chip card an access control function for access to the data radio function of the communication module, for example, may then be realized.

The communication module may comprise an Internet computer. The term "Internet computer" in this connection includes generally any and all hardware and software components which are necessary for an Internet communication. These include, for instance, a microprocessor having appropriate storage devices, a bus system and a modem having a telephone connection or a radio interface as hardware components. As the most important software components, an operating system including a web browser and/or JAVA engine are to be mentioned here.

The communication module is preferably coupled with the portable operating device of the multimedia system according to the invention in a wireless fashion. This wireless coupling may be implemented by a coupling using infrared radiation, for example. In that case the communication module is provided with

an infrared receiver unit or an infrared transceiver unit. The portable operating device then includes an infrared transmitter or an infrared transceiver unit.

The portable operating device of the multimedia system may have an interface device for accommodation and evaluation of a chip card so as to realize an access control function in the portable operating device.

The portable operating device of the multimedia system of the invention may have an input unit with which pointer information and release information may be generated in a user-defined manner as control information to select specific display information on the display device of the multimedia system. Preferably, the input unit of the portable operating device has a track ball means, a scroll wheel, a cursor block or the like in order to be able to move and position a pointer or cursor on the display device in the fashion of a mouse on the screen displayed. The input unit may furthermore have a key for inputting the confirmation of the selection in the fashion of clicking a button or a double click of a mouse.

The portable operating device may also be an infrared mouse, for example, which is preferably provided with an access control function. Such access control function of the infrared mouse may for its part be realized by a chip card reader and an associated chip card which may simply be inserted into a corresponding accommodation means of the infrared mouse.

The portable operating device or remote control may also be provided with an alphanumeric keypad, so as to be able to input commands and addresses as well as control commands for the communication module in the set top box.

The access control function of the chip card in the portable operating device may be used to set up an additional order and payment function, for which there is no provision in a standard set top box, for instance, but which is additionally required in specific applications. One such application is, for instance, the payment and/or order function, via the Internet, for instance, which may be enabled by means of the access control function of the portable operating device. This additional access control function or enable function may also be set up by an additional second chip card in the communication module. In this case the communication module is provided with appropriate means for realizing these two different access control functions. When the communication module is configured as a plug-in type PC card, it will in this case have an appropriately designed interface for the accommodation and evaluation of two chip cards, that is, a dual card reader.

The portable operating device preferably has an encrypting means so as to be able to encrypt the control information for the communication module in the set top box. The encrypting means may be integrated on the exchangeable chip card which is inserted into the portable operating device.

In this case the communication module has a corresponding decrypting means which decodes the encoded messages or control information transmitted by the portable operating device. The decrypting means may be integrated in the PC card, for example, or may be accommodated on the exchangeable chip card of the PC card if the communication module is configured as a PC card.

Where a bidirectional communication is provided between the portable operating device and the communication module in the set top box, the communication module may have an encrypting device for the messages transmitted to the portable operating device, which in this case has for its part a

decrypting device for the encrypted messages transmitted from the communication module.

The communication module and/or the portable operating device of the multimedia system in accordance with the invention may have a user identification unit, more particularly a SIM module (SIM = Subscriber Identification Module), or may have a SAM module (Subscriber Access Module). In this manner, the communication module may further serve to establish an authorization of connections for banking or electronic commerce via a protected equipment identification, aside from the customer identification. Additionally or as an alternative, the identification may be effected by means of a fingerprint sensor which is arranged on the upper side of the operating device.

Other advantageous further developments of the multimedia system in accordance with the invention will be apparent from dependent claims 2 to 36.

According to claim 37 the portable operating device, more particularly a remote control device, of the invention, for the generation and transmission of control information for the control of a communication module and/or of a display device, in particular a television set having a set top box, comprises an input unit for inputting information, a processing unit, in particular a microprocessor, for processing the information and for generating the control information, a transceiver unit which converts the control information into control signals and transmits the same to the communication module and/or to the display device, and an interchangeable access control module which controls the generation of the control information and/or the transmission of the control signals.

It is possible, for example, with the operating device in accordance with the invention to realize also subsequently an

additional access function, for instance an order and payment function such as, e.g., a banking or electronic commerce function etc. of a multimedia system.

Advantageous further developments of the portable operating device in accordance with the invention will be apparent from dependent claims 38 to 47.

According to claim 48 the communication module of the invention for a set top box has a transceiver unit for, e.g., wireless communication with a radio communications network, a superordinate computer, or a telephone network or the like, for instance, and a unit for coupling the communication module with an operating device assigned to it.

Advantageous further developments of the communication module in accordance with the invention will be apparent from dependent claims 49 to 61.

Further advantages, advantageous further developments and possibilities of application of the present invention will be appreciated from the following description of embodiments of the invention in conjunction with the accompanying drawings in which:

Figure 1 shows an embodiment of the multimedia system of the invention;

Figure 2 shows a diagrammatic representation of a set top box as base station, which may be used in the multimedia system of Figure 1 in accordance with the invention, with a communication module according to the invention and with a conventional CAM module;

Figure 3 shows a perspective view of the communication module of Figures 1 and 2 in accordance with the invention, which is configured as a PC card with a chip card;

Figure 4 shows a perspective view of a further embodiment of the communication module in accordance with the invention, which in this case is configured for a multimedia card; and

Figure 5 shows a perspective view of a third embodiment of the communication module in accordance with the invention, having a telephone plug connector.

In Figure 1 there is shown an embodiment of the multimedia system in accordance with the invention, comprising a portable operating device 40, a set top box 10 as base station, and a television set 50 as display device, the television set having a screen 52.

The set top box 10 has the usual connections, components and interfaces (not shown) as are required for, e.g., satellite reception, cable television, a video cassette recorder etc., and it is configured for the reception and the conversion of digital television signals. The receive section or the receive means of the set top box 10 is provided with a satellite tuner, an MPEG-2-decoder, a demodulator, a demultiplexer, etc., that is, the usual components for receiving digital television. The set top box 10 furthermore has a central control unit 13 which manages and controls all of the data and signal streams in the set top box 10 and which typically comprises a microprocessor including an operating system and further hardware components such as, e.g., a semiconductor storage, a RAM and a ROM, a bus system for data signals, address and control signals, etc.. The set top box 10 further has a CI interface device 12 as an open interface in accordance with the DVB CI standard, a substandard of the PCMCIA standard which is more commonly also referred to

as PC card standard, and is designed for the processing of an MPEG-2-data stream with 70 Mbits/sec. which occurs in the processing of digital television signals in the set top box 10. On the output side the set top box 10 is provided with a usual digital-to-analog converter circuit (not shown) which converts the digital MPEG television signal into an analog television signal, for example an RGB signal or a composite color picture signal, which can be displayed by the television set 50. The set top box 10 also has a standard telephone modem 11 with a telephone connection.

The set top box 10 as shown (cf. Figure 2 as well) has at least two slots for PC cards in accordance with the DVB CI standard. Inserted in one of the slots is a common CAM module 60 as access control module. The CAM module 60 serves to decode or descramble an encoded digital television signal. For this purpose the CAM module 60 substantially comprises a descrambler 66 having a Conditional Access Processor for descrambling the encoded digital television signal, a CAM control unit 64, for example a microcontroller, for the management and control of the functions of the CAM module 60, a memory 63, for example a flash memory, which has important parameters and data for the descrambling process stored therein, and a smart card interface 61 providing the interface with a smart card 70 which is configured in accordance with the ISO 7816 smart card standard, for example. The encoded digital television signal in the digital MPEG-2-data format can only be descrambled by means of the assigned smart card 70 plugged into the CAM module 60. In addition, the CAM module has a CI interface 62 for setting up the connection of the CAM module 60 with the DVB CI interface device 12 of the set top box 10.

Plugged into the second slot of the set top box 10 is a further PC card which is configured as communication module 20 in accordance with the invention (cf. Figure 3 as well). The

communication module 20 includes a complete data radio modem 24 having a radio antenna 27, a radio frequency transceiver section, a modem control, demodulators and modulators as well as interfaces for further processing. The data radio modem 24 is structured in accordance with the DECT standard or the GSM standard, for instance, and serves for the transmission and reception of radio data in a bidirectional communication. The communication module 20 further comprises an infrared transceiver unit 22 for wireless coupling or communication with a portable operating device 40, and a control unit 28 substantially comprising a microprocessor, a ROM/RAM memory, a bus system for distributing address, data and control signals, and interfaces for providing a connection to the other components of the communication module 20. The control unit 28 has the function of an Internet computer with the aid of which a communication into the Internet or the World Wide Web is set up, controlled and managed. An operating system, browser software, a JAVA engine and modem communication software are installed in the control unit 28 in order for it to be able to fulfill the functions of an Internet computer. A decompressor 21 of the communication module 20 converts the received digital data, which are provided by the data radio modem 24, into decompressed data which are processed further by the control unit 28. Under the control of the control unit 28, a converter 23 converts the image, sound and text data which are received from the Internet via the data radio modem 24 and are accordingly present in the format of the World Wide Web pages, in the HTTP format, or in a computer format, into the digital MPEG television format, which can be processed further by the set top box 10. The communication module 20 further has a CI interface 29, which corresponds to the PCMCIA Type II Extended, for instance, and which connects the communication module 20 with the CI interface device 12 of the set top box 10 and outputs the MPEG data stream from the converter 23 to the CI interface device 12. A chip card interface 26 of the communication module 20

accommodates a chip card or bank card 25 inserted into the communication module 20. The bank card 25 has an access control function for account transactions via the Internet or World Wide Web.

The portable operating device 40 in accordance with the invention comprises an operating unit with an alphanumeric keypad 42, a cursor key block 44, a release key 45, a switch-over key 46 and a track ball 48, a display 49 for displaying, e.g., the current function of the portable operating device 40, an infrared transceiver device for transmitting and receiving infrared signals 41 to and from the communication module 20, and a chip card interface (not shown) for providing a connection with a chip card 47 inserted in the portable operating device 40.

By actuating the track ball 48 the user of the portable operating device 40 may move and position a pointer 56 on the screen 52 of the display device 50 in the nature of a mouse. The release key 45 may be used to confirm a display information on which the pointer 56 has been positioned by means of the track ball 48. The switchover key 46 may be used to change over from an Internet mode of the portable operating device 40 to a television command mode of the portable operating device 40, and vice versa. The alphanumeric keypad 42 may be used to input any desired addresses such as, e.g., for the World Wide Web, as well as control commands and data. An access control for controlling access to an order and payment function is implemented on the chip card 47. The software for the control and display of the pointer 56 is implemented in the control unit 28 of the communication module 20.

The portable operating device 40 has an encrypting means or an encrypting function which encrypts the payment and/or order information, pointer information, release information,

etc. generated by the portable operating device 40 as control information. This encrypting function is performed by the control unit of the portable operating device together with a corresponding encrypting/decrypting software. The encrypted control information is converted by the infrared transceiver unit 43 of the portable operating device 40 into corresponding infrared signals 41, which are in turn received by the infrared transceiver unit 22 of the communication module 20. The control unit 28 decrypts the encrypted control information for the further processing. To this end, a decrypting software is installed in the control unit 28. The other way round, any messages which are to be transmitted from the communication module 20 to the portable operating device 40 are at first encrypted by the control unit 28 of the communication module 20 and transmitted as encrypted messages in an infrared signal from the infrared transceiver unit 22 to the portable operating device 40, where the infrared signals received are converted by the infrared transceiver unit 43 of the portable operating device 40 into encrypted control information, which will then in turn be decrypted again by a corresponding decrypting function which is implemented in the processing device or control unit of the portable operating device 40.

When the user wishes to place an order via the Internet, for example, he will first switch the portable operating device 40 to the Internet mode with the aid of the switchover key 46. In the process, the portable operating device 40 generates an appropriate control information, which is transmitted between the operating device 40 and the communication module 20 via the infrared transfer route and is processed by the control unit 28 of the communication module 20. The control unit 28 of the communication module 20 will thereupon set up a communication link to an Internet provider or to the Internet, making use of its operating system and the Internet software, i.e. the browser, and the data radio modem 24. Using the alphanumeric keypad 42

of the portable operating device 40, the user will then input an Internet address or a World Wide Web address which will again be transmitted from the portable operating device 40 to the communication module 20 and will be accessed there via the browser and via the radio data modem 24. The communication module 20 receives, via the radio data modem 24, the data which is returned by the address or HTTP page accessed and which is converted via the decompressor 21 into a digital, decompressed format which could be displayed on the monitor of a PC. The decompressed data of the homepage received will thereafter be converted by the converter 23 of the communication module 20 from the present personal computer data format into the digital MPEG-2-television data format. The homepage in the digital MPEG-2-television data format will subsequently be output to the DVB CI interface device 12 of the set top box 10 via the CI interface 29 of the communication module 20 under the control of the control unit 28 or the Internet computer. This digital television data signal, which corresponds to the data of the requested homepage, is converted by the central control unit 13 of the set top box 10 by a television signal digital-to-analog converter (not shown) of the set top box 10 into an analog RGB signal which is supplied via a SCART cable to the television set 50 as the display device and is displayed by the latter as World Wide Web page or homepage.

In Figure 1 a plurality of fields of the Web page or homepage displayed on the screen 52 of the display device 50 are illustrated, namely, a payment field 54 and order fields 55. The user will now operate the track ball 48 of the portable operating device 40 and move the pointer 56 on the screen 52 to a particular order field 55, indicating the PRODUCT1, which the user intends to order. Thereafter, he will actuate the release key 45 of the portable operating device 40 to confirm the order. The pointer position information and confirmation information or release information generated in the order process

will again be transferred, via the infrared path, to the communication module 20 where it will be converted by the control unit 28 into a movement of the pointer 56 on the display device 50 by means of the mouse software installed, to the extent that the pointer information is hit. The confirmation information and the pointer information will be supplied by the control unit 28 to the data radio modem 24, which responds by sending signals that correspond to the information back to the address of the homepage accessed. The user will then again actuate the track ball 48 of the portable operating device 40 in order now to move the pointer 56 to the payment field 54 and to position it there. By means of the release key 45 the user will then confirm payment of the product previously ordered. The control information for the order and payment can be produced only when the chip card 47, which includes a payment and order authorization as access control function, is inserted in the portable operating device 40. After the payment information has reached the communication module 20 via the infrared transmission path and has been processed by the control unit 28 of the communication module 20, the control unit 28 will output the confirmation of payment to the homepage address involved via the browser installed and the data radio modem 24.

On the basis of the payment confirmation by the user the control unit 28 or, respectively, the Internet computer will next establish a World Wide Web communication link with the user's bank so as to carry out an Internet payment transaction for payment of the product ordered. For this purpose the control unit 28 of the communication module 20 will set up a link with the website or homepage of the user's bank. The Internet transaction is made possible by the bank card 25 being inserted in the communication module 20 and which includes appropriate transaction authorizations as access function.

On the other hand, when the user wishes to control the digital television on the display device 50, for instance the program selection, he will actuate the switchover key 46 on the operating unit of the portable operating device 40 and switch it over to the television mode. This switchover action is communicated to the control unit 28 of the communication module 20 via the infrared path by means of appropriate control information; the control unit 28 will then supply all incoming control information as television control commands to the set top box 10 via the CI interface 29 and the CI interface device 12, for the control of the television function.

Figure 3 illustrates the communication module 20 used in the multimedia system according to Figures 1 and 2 together with the bank card 25. Optionally, the communication module 20 may have a SAM module 30 to support a protected equipment identification, in particular for banking or electronic commerce.

Figure 4 shows a further embodiment of the communication module in accordance with the invention. The communication module 81 is likewise designed as a plug-in type PC card and is adapted to accommodate a multimedia card 80. It is likewise provided with an infrared interface 85 and a data radio modem interface the same as the communication module 20 of Figure 3.

In Figure 5 there is illustrated a third embodiment of the communication module in accordance with the invention. The communication module 83 as shown is equipped with an ISDN-based telephone modem and has a telephone plug connector 84 for a telephone cable to be plugged in. The communication module 83 further has an infrared interface 85, which has been discussed in detail above with reference to the communication module 20 of Figures 1 to 3. A chip card 86 including an access control function may be inserted into the communication module 83.

The multimedia system may be operated simultaneously with two activated access control modules which are controlled by the portable operating device. A first access control module is a CAS module and a second module is an Internet computer which may support the overlay of the browser information over the television video data (television picture) of the CAS module. The two data streams, the video data and the Internet data, may interact and thus generate individual shopping scenarios or even classes of scenarios (e.g., a loyalty scenario, a premium user scenario, interactive game scenarios). The Internet and TV data streams are correlated in terms of time, the individual component being in each case dictated by the individual Internet access, the user profile. The Internet channel is the forward and backward channels at the same time.